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ABSTRACT

Age, gender, cultural, and socioeconomic differences in relations between middle school students' motivational goal orientations, their cognitive and metacognitive strategies, and their academic achievement in a variety of curriculum domains were studied. Studies to date typically have used either cognitive or motivational variables to account for variations in students' academic achievement. This study combines cognitive and motivational variables to gain a more complete understanding of the processes underlying student academic achievement. Participants were 602 middle school students in Sydney (Australia). Results suggest that differences in each of the variables of age, gender, cultural background, and socioeconomic status are strongly related to differences in relations between students' academic motivation, cognition, and achievement. This finding suggests that studies of motivational and cognitive differences should take these variables into account. (Contains 6 tables, 8 figures, and 50 references.) (SLD)

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Age, Gender, Cultural, and Socioeconomic Differences in Students' Academic Motivation, Cognition, and Achievement.

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Paper presented at the annual meeting of the American Educational Research Association

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This paper investigates age, gender, cultural, and socioeconomic differences in relations between middle school students' motivational goal orientations, their cognitive and metacognitive strategies, and their academic achievement in a variety of curricula domains. Typically, studies to date have used either cognitive or motivational variables to account for variations in students' academic achievement. Far fewer studies have combined cognitive and motivational variables, alongside relevant student characteristics, in order to gain a more complete understanding of the processes underlying students' academic achievement. Moreover, where such interactive studies have occurred they have, again typically, not investigated how relations between students' academic motivation, cognition, and achievement may, in turn, be related to relevant student characteristics such as their age, gender, or cultural background. The present paper, however, seeks not only to explore relations between students' academic motivation, cognition, and achievement, but to explore how these relations may vary as a function of students' age, gender, cultural, and socioeconomic background. The results of the present study suggest that differences in each of these later variables are strongly related to differences in relations between students' academic motivation, cognition, and achievement.

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Purposes

The primary purposes of the present study are to:
(a) identify relations between middle school students' motivational goal orientations, their cognitive and metacognitive strategies, and their academic achievement in a variety of curricula domains; and
(b) show how differences in theses relations are, in turn, related to differences in students' age, gender, cultural background, and socioeconomic background.

Theoretical Orientation

Relations between students' academic motivation, cognition, and achievement

Most educators agree that effective learning involves the ability to self-regulate a variety of thoughts, feelings, and actions associated with learning processes (eg. Meece, 1994; Schunk, 1991; Zimmerman, 1990). In particular, the ability to activate, and appropriately apply, a variety of cognitive and metacognitive strategies in order to acquire specific content has been heavily implicated in the quality of students' academic performance and the extent of their academic achievement (Meece, 1994; Derry, 1990). In response to this, recent research has focused on the nature and function of the cognitive and metacognitive strategies students use (or do not use) to acquire, integrate, and retrieve information (Hong, 1995; Zimmerman & Martinez-Pons, 1988).

Theoretical models using cognitive and metacognitive strategies to explain students' achievement have, however, not always adequately explained (a) why students may or may not (particularly in 'real life' classroom situations) activate strategies during given learning tasks, and (b) why students fail to transfer relevant strategies from one task or situation to another (Pintrich & Schrauben, 1992). In other words, these cognitive models have not always adequately explained why students may, or may not, expend *effort* to activate and/or transfer strategies. This is particularly important because successful activation and transfer of strategies *requires* effort. If students do not expend appropriate effort their strategic knowledge will be rendered ineffective (or, at least, be of reduced effectiveness) in contributing to their academic performance.

The *selective* activation and transfer of strategies may be attributed to purely cognitive factors such as routinisation, effective encoding, and the productive use of self-regulatory processes (Schneider & Pressley, 1989). However, recent research indicates that strategy activation and transfer is also dependent upon a variety of motivational variables (Graham & Golan, 1991; Meece, Blumenfeld, & Hoyle, 1988). Hence, students' level of *cognitive engagement* (the extent to which students activate and transfer prior knowledge and strategies) is a function of *both* motivational *and* cognitive factors working together (Pintrich & Schrauben, 1992). In particular, students' motivational goals (the purposes they espouse for wanting to achieve in academic situations) have been implicated in the quality of students' cognition and their subsequent academic achievement (Meece, 1994; Pintrich & Schrauben, 1992).

Despite this, the *interaction* of motivational and cognitive variables (such as students' goals and strategies) in explaining students' cognitive engagement and subsequent academic achievement, has been largely avoided or ignored. With some exceptions it has, until recently, been more common to attempt to explain students' academic cognition and achievement in *either* motivational *or* cognitive terms rather

than through a combination of both. Examining the interaction of motivational and cognitive variables, however, as the present study does, should help explain more fully the functioning of students' cognitive processes and the effect(s) these have on students' achievement. (Borkowski, Carr, Rellinger, & Pressley, 1990; Pintrich & Schrauben, 1992).

Age, gender, cultural and socioeconomic differences

Students' motivational orientations, cognitive processes, and patterns of academic achievement, as well as relations between them, are hypothesised (in both the literature and the present research) to be influenced by a variety of personal, social, and cultural variables. Although the list of these 'facilitating' variables is, potentially at least, very long; particular variables have been shown to, relatively consistently, influence students' motivation, cognition, and achievement. These variables include students' age and gender, and differences in their cultural and socioeconomic backgrounds. Literature related to each of these variables is briefly reviewed below.

Age differences.

Researchers have begun to examine the differential effects, and developmental nature, of students' motivation and cognition across different age groups (Middleton & Midgley, 1997; Pintrich, Marx, & Boyle, 1993). However, age differences in students' motivation, cognition, and achievement have not often been the primary focus of research. This said, where age differences have been explicitly examined, there appears to be some consistency in research findings. Most studies appear to indicate that age differences do influence students' motivation, cognition, and achievement.

In relation to students' cognition, for example, studies indicate that young students are not skilled at self-monitoring their comprehension (Wagoner, 1983; Markman & Gorin, 1981) or adjusting their use of metacognitive and cognitive strategies (Borkowski, et al., 1990). Nevertheless, children's ability to do so does improve with age and reading ability (Forrest-Pressley & Walker, 1984). Moreover, even young children can be taught to effectively use cognitive and metacognitive strategies (Ghatala, Levin, Pressley, & Goodwin, 1986; Ghatala, Levin, Pressley, & Lodico, 1985). Despite this, on the whole, younger students will be less adept appraisers and managers of their learning behaviour.

In relation to students' motivation, several authors (e.g. Anderman & Maehr, 1995; Epstein, 1989) have emphasised the developmental nature of students' motivation. In particular, these authors have emphasised the way in which students' motivational orientations are effected by a complex set of interacting social and cognitive variables which differentially operate upon, and within, students across time. However, what is not clear from the literature is exactly how developmental processes may influence students' motivational (and cognitive) processes. As a result there are few concrete hypotheses extant in the literature and the area, as a whole, warrants considerable further investigation (Middleton & Midgley, 1997). Nevertheless, the fact that age differences in motivation and cognition have been identified across a range of ages, and in a variety of educational settings, provides some basis for further research.

Gender differences.

Although most studies exploring relations between students' goals and cognitive processes have employed samples including both males and females, few have specifically examined relations between students' gender, goal orientations, and

cognition (see Bouffard, Boisvert, Vezeau, & Larouche, 1995; and Meece & Holt, 1993, for two exceptions). Fewer studies still have hypothesised the direction in which gender differences might effect students' motivational orientations and cognitive processes. Some recent studies (e.g. Anderman & Young, 1994; Kaplan & Maehr, 1996; Midgely & Urdan, 1995) have investigated gender differences in students' motivation whilst others have investigated gender differences in patterns of students' learning and achievement which may be related to students' differing motivational orientations (e.g. Bouffard *et al*, 1995; Meece & Holt, 1993; Wentzel, 1991).

Despite the above research, the literature is not unanimous that gender differences influence students' motivation, cognition, and achievement. Some studies (e.g. Meece & Jones, 1996; Midgely, Arunkumar, & Urdan, 1996, Ford, 1993) have identified no, or only small, gender differences with respect to these variables. Thus, there is divergence in the literature as to whether or not and, if so, how; gender differences effect students' motivational orientations and cognitive processes.

Cultural differences.

Many authors have pointed out that Western values dominate the field of psychology and that the cultural assumptions associated with these values are often accepted as universal. Research has indicated, however, that there are significant differences between Western and non-Western thinking and, thus, what educators take to be psychological norms in one culture may not be applicable others (Heckhausen, 1991). This may be particularly true of students' motivation and cognition (Fryans, Maehr, Salili, & Desai, 1983; Kornadt, Eckensberger, & Emminghaus, 1980; Maehr & Nicholls, 1980). Cross-cultural studies in motivation and cognition are becoming more prevalent and, as a result, identifiable similarities and differences between the cognitive processes and motivational orientations of students from different cultures are becoming more widely known.

For example, in a series of studies McInerney (1995, 1994; and with Roche, McInerney, & Marsh, 1997), has been able to distinguish (despite some notable similarities) between the motivational orientations, cognition, and related achievement outcomes, of Aboriginal-, migrant-background-, and Anglo-Australians. Similarly, Kaplan and Maehr (1996) identified differences between African- and Anglo-American students' goal orientations. Holt and Keats (1992) also found that both students' values, and the structure of their achievement goals, differed according to their cultural background.

In contrast to the above, however, several studies have not identified cultural differences in students' motivation, cognition, or achievement. Lucas and Stone (1994), for example, in a survey of high school and college students, found no differences between the competitive motivational orientation of Mexican- and Anglo-American students even taking into account differences based on students' level of schooling or acculturation. Midgley, Arunkumar, and Urdan (1996), similarly, found no significant differences in the task and performance goal orientations of African- and Anglo-Americans. Moreover, in a very recent study, McInerney, Hinkley, and Dowson (1997) found few 'between-group' differences in the motivational beliefs of Anglo, migrant-background-, and Aboriginal-Australians.

Thus, there is, in a similar fashion to gender differences, divergence in the literature as to the nature and extent of the effects of cultural differences on students' motivation and cognition. What is clear is that students' cultural background *may*

effect their motivation and cognition and so, especially where cultural differences are present in research samples, they ought to be explicitly examined.

Socioeconomic differences.

Students' socioeconomic backgrounds have long been recognised as a significant potential influence on their academic performance and achievement (Duncan, Featherman, & Duncan, 1972; Boocock, 1980). Whilst the reasons for this influence are not always clear, particular features of students' socioeconomic backgrounds have consistently been shown to influence students' motivation, cognition, and achievement. These features include, particularly, parental attitudes and practices which are linked to families' socioeconomic status (Epstein, 1989, 1985). For example, Stevenson & Baker (1992) found that students from higher socioeconomic backgrounds are more likely to have participated in positive learning experiences outside of school (what they called 'shadow education') and that participation in these experiences, in turn, increases the likelihood of students attending university. McInerney (1994, Roche, McInerney, & Marsh, 1997), similarly, found that both the quantity and quality of students' academic motivation may be influenced by parental encouragement and their support of students' school achievement.

Thus, recent research affirms the influence of students' socioeconomic backgrounds on important aspects of their motivation, cognition, and achievement. There is still considerable debate in the literature, however, as to how variables related to students' socioeconomic backgrounds may influence particular aspects of students' motivation, cognition, and achievement. Thus, as with the other variables above, there is, at least, a case for the inclusion of socioeconomic status as a variable in research studies even if specific hypotheses as to the direction of its effects on students' motivation and cognition are difficult to generate.

Students' school perceptions

Finally, in addition to the variables reviewed above, students' perceptions of their school have also been shown to effect their motivation, cognition, and achievement. In a review of the relevant literature Dickenson (1995), for example, found that students' positive perceptions of school, particularly their positive perceptions concerning the degree of autonomy they are given in learning situations, were related to their motivation and learning. Similarly, in a recent series of studies, Dowson and Cunneen (1997, 1998a, b) have identified students' perceptions of the academic support they receive at school, and their overall sense of belonging to their school, as important indicators of their academic motivation, cognition, and achievement. In addition, these studies have shown that students' perceptions of school may be enhanced when their school environment actively supports their academic efforts and promotes their sense of community and belonging within their school. These results are consistent with other studies which, similarly, indicate that students' motivational orientations and cognitive processes may be influenced by particular policies and practices implemented within schools (Anderman & Maehr, 1995; Maehr & Midgley, 1991, Ames, 1992).

Summary

The brief review above indicates that students' age, gender, cultural, and socioeconomic differences, as well as their perceptions of their learning environments, may all influence their motivational orientations, cognitive processes, and academic

achievement. Research evidence to date is not conclusive enough to formulate many specific hypotheses as to the direction in which each of these variables may effect students' motivation and cognition. However, there is certainly sufficient evidence to suggest that investigating these differences may lead to a more complete understanding of interacting processes underlying students' motivation, cognition, and achievement.

Research Model

In order to facilitate an investigation of these differences, the present study proposes a research model which links students' perceptions of their school environments, their goal orientations (their purposes for academic achievement), their strategy use, and their academic achievement. Consistent with similar models elsewhere (eg. Pintrich et al, 1993), the present research model proposes that students' perceptions of school influence their goal orientations which, in turn influence their strategy use and academic achievement. A simplified version of the research model used in the present research is presented in Figure One.

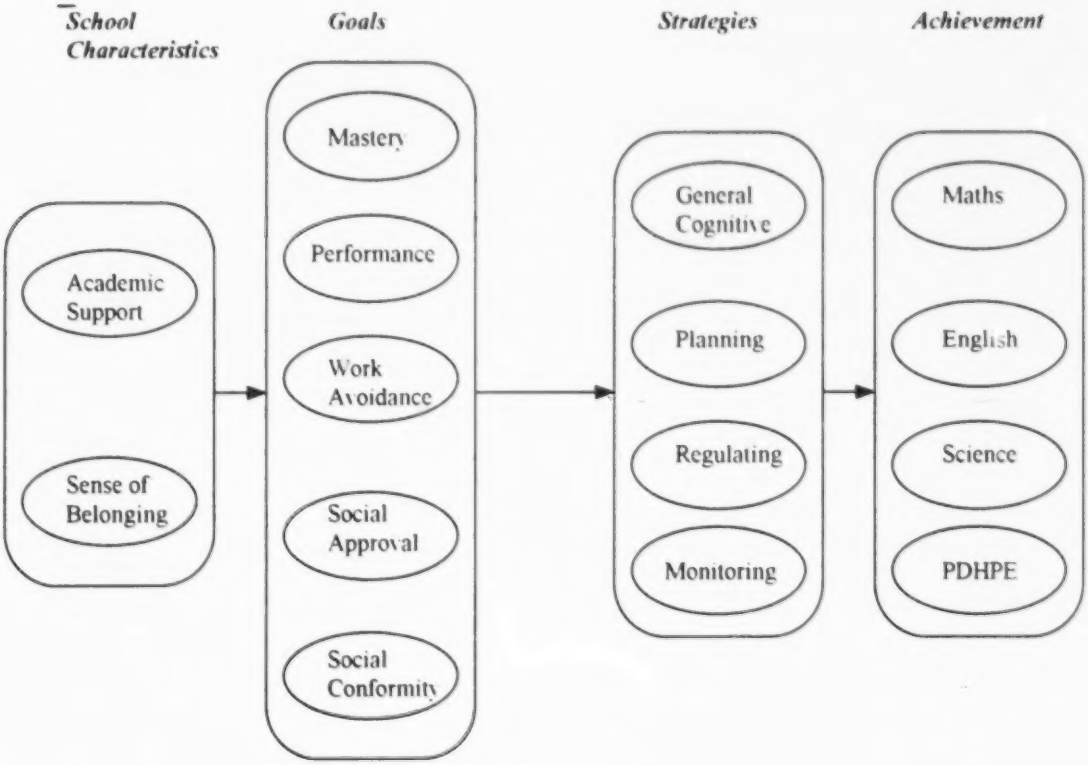

Figure 1. A simplified version of the research model used in the present research

Each of the elements in the proposed model will be described further in the *Method* section below.

Method

Participants

The data in the study represent responses from six-hundred and two (602) middle school students attending four (4) high schools in the Sydney metropolitan region. The schools were selected from a range of geographic and educational regions within the Sydney metropolitan area. Approximately equal numbers of male and female students from a wide cross-section of cultural, socioeconomic, and academic backgrounds are represented in the sample. Demographic statistics for the participants are presented in Table One below.

Table 1
Students' Demographic Data

Age	*12 years*	*13 years*	*14 years*	*15 years*	*Average*
	112 (19%)	206 (34%)	221 (37%)	63 (10%)	13.3 years
Gender	*Female*	*Male*			
	328 (54.5%)	274 (45.5%)			
Year at School	*Year 7*	*Year 8*			
	318 (53%)	284 (47%)			
Place of Birth	*Australia*	*Overseas (English Speaking)*	*Overseas (Non-English Speaking)*		
	476 (79%)	30 (5%)	96 (16%)		

Measures

The study surveyed the participants to determine their school perceptions, motivational goal orientations, use of cognitive and metacognitive strategies, and academic achievement in four curricula areas. The instrument used to collect these data was the Goal Orientation and Learning Strategies Survey (GOALS-S), the psychometric properties of which have been established in a previous study (Dowson & McInerney, 1997). Specifically, the GOALS-S was designed to measure students' perceptions of the academic support they received at school, and their sense of belonging to their school, alongside a selection of their academic goals (n=3), social goals (n=2), cognitive strategies (n=3) and metacognitive strategies (n=3). Table Two below provides brief definitions, and a sample item, for each of the GOALS-S scales measuring students' school perceptions.

Table 2
GOALS-S Scales Measuring Students' School Perceptions

Construct	**Brief Description**
Academic Support	Refers to the level of academic support students' perceive they receive from their teachers and/or their school as a whole. **Sample Item:** The teachers at this school support me in my studies.

Sense of Belonging	Refers to students' perceived sense of belonging to their school. Students' sense of belonging implies feelings of psychological security and stability within their school environment. **Sample Item:** I feel like I belong in this school.

Table Three provides brief definitions, and a sample item, for each of the GOALS-S scales measuring students' academic and social goals.

Table 3
GOALS-S Scales Measuring Students' Social and Academic Goals

Construct	Definition
Academic Goals	The academic reasons students espouse for wanting to achieve in academic situations.
Mastery	Wanting to achieve academically in order to demonstrate understanding, academic competence, or improved performance relative to self-established standards. **Sample Item:** I want to do well at school to show that I can learn new things.
Performance	Wanting to achieve academically in order to demonstrate ability, out-perform other students, attain certain grades /marks, or to obtain tangible rewards associated with academic performance. **Sample Item:** I try to do well in school so that I get better marks in school than other people.
Work Avoidance	Wanting to achieve academically with as little effort as possible. Conversely, avoiding demanding achievement situations in order to minimise expended academic effort. **Sample Item:** I always choose easy work at school so that I don't have too much trouble.
Social Goals	The social reasons students espouse for wanting to achieve in academic situations.
Social Approval	Wanting to achieve academically in order to gain the approval of peers, teachers, and/or parents. Conversely, wanting to achieve in order to avoid social disapproval or rejection. **Sample Item:** I want to do well in my schoolwork so that other people can tell me I did well.
Social Conformity	Wanting to achieve academically in order to show compliance with, or avoid transgression of, particular rules and procedures which apply in academic achievement situations. **Sample Item:** I do good schoolwork so that I don't have any trouble with my parents or teachers.

Table Four provides brief definitions, and a sample item, for each of the cognitive and metacognitive strategies measured by the GOALS-S.

Table 4
GOALS-S Scales Measuring Students' Cognitive and Metacognitive Strategies

Construct	Definition
Cognitive Strategies	Are the means by which students select, acquire, and integrate new knowledge with existing knowledge.
Elaboration	Refers to the formation of helpful connections between new and old information. Elaboration may involve paraphrasing, generating analogies, or reviewing previous work. **Sample Item:** When learning things for school try to see how they fit together with other things I already know.
Organisation	Refers to the ways in which students structure their knowledge in order to enhance the assimilation of new information. Organisation may involve selecting, sequencing, outlining, re-ordering or summarising important information. **Sample Item:** I rearrange my school notes when I want to learn things for school.
Rehearsal	Refers to the basic memorisation of factual information. Rehearsal may involve listing, memorising, reciting, and/or naming facts/items to be learned. **Sample Item:** When I want to learn things for school I practice repeating them to myself.
General Cognitive Strategies	In the present research refers to a combination of the three strategies above.
Metacognitive Strategies	Are the means by which students self-manage their learning behaviour and affect.
Monitoring	Refers to the implementation of self-checking and self-assessment measures. Monitoring may involve self-checking for understanding, self-testing, and organised reviews of previously learned material. Monitoring implies systematising attempts to evaluate the assimilation and organisation of learned material. **Sample Item:** I often ask myself questions to see if I understand what I am learning.
Planning	Refers to the implementation of self-directed organisational strategies designed to enhance learning. Planning may involve prioritising, time management, scheduling, setting realistic goals, and arranging work environments appropriately . Planning implies thoughtful preparation for completing work. **Sample Item:** Before trying to learn things for school I try to decide what are the most important parts of what I am trying to learn.
Regulation	Refers to the implementation of strategies designed to counter difficulties identified when monitoring. Specific regulatory strategies may include attempting different ways to learn material, seeking explanations from teachers, or correcting mistakes in reasoning. **Sample Item:** If I need to, I change the way I study so that I can learn new things.

Item scales, of which the items in the above tables are examples, were devised to measure each of the constructs defined above. The factorial validity of the scales was assessed using Confirmatory Factor Analyses (CFAs) in Linear Structural Relations (LISREL), Version 7 (Joreskog & Sorbom, 1989). Some variations to the composition of the scales were made during the CFAs. Only scales which demonstrated substantial validity were included in the present research. The fit statistics for the one-hundred items measuring the constructs above, as well as other constructs not included in the present research, are presented in Table Five.

Table 5
Fit Statistics for the GOALS-S Items

Model Description	CHISQ	df	CHI/df	GFI	AGFI	RMSR	TLI	RNI
Null Model	95366.70	4950	19.266	0.000	0.000	0.000	0.000	0.000
Hypothesised Model	8829.27	4679	1.887	0.963	0.914	0.037	0.904	0.916

Note
Chisq = chi-square value
df = degrees of freedom
Chisq df = chi-square degrees of freedom ratio
GFI = Goodness-of-fit index
AGFI = Adjusted goodness-of-fit index
RMSR = Root mean square residual
TLI = Tucker-Lewis index
PNI = Parsimony relative non-centrality index

$$TLI = \frac{[\text{Chi-square degrees of freedom (null model)}] - [\text{Chi-square degrees of freedom (hypothesised model)}]}{\text{Chi-square (degrees of freedom -1) (null model)}}$$

$$PNI = \frac{[\text{Chi-square - degrees of freedom (null model)}] - [\text{Chi-square - degrees of freedom (hypothesised model)}]}{\text{Chi-square - (degrees of freedom -1) (null model)}}$$

The statistics in Table Five confirm the substantial validity of the GOALS-S scales. The reliability of each of the scales was also confirmed. Chronbach's Alpha for the scales ranged between 0.77 and 0.91. For the present study, the means of each of the scales were used to construct the path analyses described below.

In addition to the above scales, the study collected data for students' academic performance in four curricula areas: Mathematics, English, Science and Personal Development, Health and Physical Education (PDHPE). Students' academic performance in these areas was represented by their end-of-year examination results which were standardised between curricula areas and schools.

After listwise deletion of missing cases, five-hundred and sixty-one cases were available for further analysis. Relations between students' school perceptions, motivational orientations, cognitive and metacognitive strategy use, and academic achievement were then assessed using path analyses within in LISREL V.7. Specifically, the parameters of the research model identified earlier were assessed for each group of interest in the study. These groups were

(a) younger students (in their first year of secondary school) and older students (in their second year of secondary school),
(b) male and female students,
(c) migrant-background and Anglo-Australian students, and
(d) students from low, medium and high socioeconomic backgrounds (as assessed by their parents' occupations).

All paths in each group analysis were assessed simultaneously. This meant that the coefficient associated with each path represents the unique association of the two variables linked by that path without 'interference' from other paths (relationships) in the model. In other words, the paths coefficients in each model are estimated taking into account the effects of inter-correlations between all variables in the model.

Once the parameters of the model, as estimated with each group, were established, relevant comparisons between the models for each group were made. For example, the parameter estimates for males were compared with parameter estimates for females, the estimates for younger students compared with the estimates for older students, etc. On the basis of these comparisons, paths which were significant to all groups in each comparison were identified and, for the purposes of the present study, excluded from further analysis. What remained, then, were only those paths *unique* to each group in a particular comparison. These unique paths were then analysed further and relevant differences identified. As an example, however, Appendix A presents a path diagram showing the common paths shared between younger and older students. This diagram may be compared with Figure Two to illustrate the differences in structure between the unique and common paths estimated for younger and older students.

Results

In order to develop some standard upon which to base an evaluation of the unique paths identified in each of the comparisons below, Table Six first compares the number of unique paths identified for each group in the comparisons with the number of common significant paths shared between each group in the comparisons. For example, the number of unique, statistically significant paths estimated for younger and older students is compared with the number of statistically significant paths common to both younger and older students. Table Six divides these common and unique estimates into three sections which follow the structure of the research model. That is, the estimates are divided into those linking students' perceptions of their school with their goal orientations, those linking their goal orientations with their strategies, and those linking their strategies with their achievement outcomes. Table Six also totals the common and unique statistically significant paths for each section of the Table and lists their percentage relative to the total number of statistically significant paths (common and unique) identified.

Table Six indicates that, of the two-hundred and fourty (240) statistically significant paths identified in the analyses, one-hundred and twenty five (125), or fifty-two percent (52%), were common to the groups compared. Conversely, one-hundred and fifteen paths, or fourty-eight percent (48%) were common to the groups compared. Thus, the analyses of group differences, which follow Table Six, are concerned with approximately one-half of the total number of statistically significant paths identified in the initial analyses.

Table 6
Comparison of Common and Unique Path Estimates

	Number of statistically significant paths					
	School perceptions with goals		Goals with strategies		Strategies with achievement outcomes	
Student Group	*Common*	*Unique*	*Common*	*Unique*	*Common*	*Unique*
Younger	7	1	7	5	5	2
Older		4		5		6
Female	13	1	10	7	3	4
Male		1		0		2
Migrant-background	4	1	7	3	4	2
Anglo-Australian		4		6		4
Low SES						
vs. medium	10	2	10	4	3	6
vs. high	6	4	12	4	8	4
Med. SES						
vs. low	10	1	10	4	3	2
vs. high	4	4	10	3	2	2
High SES						
vs. low	6	0	12	4	8	2
vs. medium	4	1	10	5	2	5
Total (%)	44 (65)	24 (35)	56 (53)	50 (47)	25 (38)	41(62)

Note.
Unique paths for each group are determined in comparison with the corresponding group in each block of Table 6. For example, the number of unique paths for younger students is determined with respect to the corresponding paths for older students and vice versa. For the comparisons involving students' socioeconomic status (SES), where there are three groups in the comparisons as opposed to two groups for previous comparisons, 'vs. low' signifies a comparison against students with low SES, 'vs. medium' signifies a comparison against students with medium SES, and 'vs. high' signifies a comparison against students with high SES.

(%) = percentage, rounded to whole numbers

Age comparisons

Figure Two presents the unique paths estimated from the responses of younger and older students. Only paths that are statistically significant are included in Figure Two. Path coefficients significant at the 0.05 level are presented in regular typeface (eg. 0.23). Path coefficients significant at the 0.001 level are bold-faced (eg. **0.35**). This same procedures apply to similar figures throughout the paper.

Insert Figure 2 about here.

Figure Two models some substantial differences between students based on their ages. Specifically, it is apparent that older students' school perceptions are linked more strongly to their goal orientations than is the case for younger students. For older students, four unique paths link their perceptions of the degree of academic support they receive at school, and their overall sense of belonging to their school, to their goal orientations. For younger students only one unique path, between their perceptions of academic support and their work avoidance orientations, is evident.

Also, it is apparent that older students' strategies are more strongly linked to their achievement outcomes than younger students' strategies. Seven unique, statistically significant, paths link older students' strategies with their achievement outcomes as opposed to two for younger students. Finally, Figure Two indicates that a different path structure links older and younger students' goals with their strategies although, overall, the same number of unique paths (five) are implicated in the models.

Gender comparisons

Figure Three presents the unique, statistically significant paths estimated from the responses of female and male students.

Insert Figure 3 about here.

Figure Three indicates substantial modelled differences between students based on their gender. Specifically, Figure Three indicates that female students' goals are much more strongly associated with their strategies than is the case for males. In fact, no unique, statistically significant paths link males goals with their strategies whereas seven unique, statistically significant paths link females goals with their strategies. Moreover, females strategies, particularly their regulatory strategies, appear to be more strongly related to their academic achievement than is the case for male students.

Cultural comparisons

Figure Four presents the unique, statistically significant paths estimated from the responses of Anglo-Australian and migrant-background students.

Insert Figure 4 about here.

Figure Four indicates substantial modelled differences between students based on their cultural backgrounds. Specifically, Anglo-Australian students' sense of belonging is more widely associated with their goals than is the case for migrant-background students. Similarly, Anglo-Australian students' goals are more widely associated with their strategy use than is the case for migrant-background students. Six

unique, statistically significant paths link Anglo-Australian students' goals to their strategies as opposed to three for migrant-background students. In particular, Anglo-Australian students' mastery goals are uniquely and widely associated with their strategy use. This is not the case with migrant-background students. Finally, Anglo-Australian students' strategies are more widely associated with their achievement than is the case with migrant-background students.

Socioeconomic Status (SES) comparisons

Low SES versus medium SES.

Figure Five presents the unique, statistically significant paths estimated from the responses of students from low and medium SES backgrounds.

Insert Figure 5 about here.

Figure Five indicates several modelled differences between students with low and medium socioeconomic status (SES). Specifically, Figure Five indicates that low SES students' perceptions of the academic support they receive at school is more strongly associated with their goal orientations than is the case with the medium SES group. More obvious is the difference in relations between students' strategies and academic outcomes based on their socioeconomic status. Here, low SES students have six unique, statistically significant paths linking their strategies with the achievement as opposed to two unique paths for the medium SES students. Finally, Figure Five indicates a different path structure linking low and medium SES students' goals with their strategies. Overall, however, the same number of paths link low and medium SES students' goals with their strategies.

Low SES versus high SES.

Figure Six presents the unique, statistically significant paths estimated from the responses of students from low and high SES backgrounds.

Insert Figure 6 about here.

Figure Six models differences between students with high and low SES. Figure Six indicates that low SES students' school perceptions are more strongly related to their goals than is the case for high SES students. In fact, no unique, statistically significant paths link high SES students' school perceptions to their goals. In addition, low SES students' strategies are more widely associated with their achievement outcomes than is the case for high SES students. Finally, although the path structure is different, both low and high SES students have their goals and strategies linked by four unique, statistically significant paths.

High SES versus medium SES.

Figure Seven presents the unique, statistically significant paths estimated from the responses of students from high and medium SES backgrounds.

Insert Figure 7 about here.

Figure Seven models differences between students with high and medium SES. Figure Seven indicates that medium SES students, when compared to high SES students, have more unique, statistically significant paths linking their school perceptions to their goals. In particular, medium SES students' sense of belonging to their school is linked widely with their goal orientations. This said, high SES students' goals are linked more substantially to their strategies, and their strategies to their achievement outcomes, than is the case for medium SES students.

Discussion

Overall, Figures Two to Seven indicate substantial differences in relations between students' school perceptions, goals, strategies, and outcomes; based on age, gender, cultural, and socioeconomic differences. Each of these differences are discussed further below.

Age Differences

The finding that older students strategies are more widely associated with their achievement outcomes is, perhaps, not surprising. As indicated in the *Theoretical Orientation* to this study, several previous studies have indicated that older students are more adept at employing strategies which, potentially at least, may enhance their academic achievement. What is of more note, in the present study, is that the difference between younger and older students' ages is very small. The younger students in the present study were only one school year behind the older students and the mean difference between the two groups' ages is only 1.1 years. Thus, although the present study is cross-sectional rather than longitudinal in nature it, nevertheless, implicates the rapid changes in students' cognition which may occur in the middle school years (eg. Anderman & Maehr, 1995).

Moreover, the present study also suggests that older students' school perceptions are more salient correlates of their goal orientations than is the case for younger students. That is, in the present study, older students' motivational orientations are more widely associated with their perceptions of school than is the case for younger students. This finding is also consistent with previous studies which suggest that, as students progress through middle school, the salience of their personal perceptions about school, with respect to their academic motivation, increases. This may be seen as both a positive and a negative development. For example, in the present case, all paths linking older students perceptions of school with their goal orientations are positive. Moreover, these goals are then positively linked with older students' strategy use and achievement. This structure allows for the possibility that older students' positive perceptions of school may lead to enhanced motivation, cognition, and outcomes. However, the structure also allows for the commonly reported possibility that older students with negative perceptions of school may display deficient academic motivation, cognition and achievement. Thus, older students' school perceptions potentially act as two-edged sword with respect their academic motivation, cognition, and achievement.

Gender Differences

It is clear from the results summarised in Figure Three that females students' goal orientations are linked in more complex ways to their strategy use than is the case for males. This, in turn, suggests that females' strategy use is, motivationally, more

complex than is the case for males. That is, females strategy use is, potentially, impacted upon by several of their unique, significant and interacting motivational orientations. For example, female students' general cognitive strategies are associated with unique paths emanating from their performance, social approval and social conformity goal orientations. A similar situations exists with females regulating strategies which are uniquely associated with both their performance and social conformity goal orientations. Whilst it is not within the scope of the present study to assess precisely what effect these interactions have on female students' strategy use, it is, nevertheless, reasonable to suggest that interactions between female students goals may, at least potentially, influence the quality and direction of their strategy use. Certainly, the potential for these interactions to influence female students' strategy use appears, from the present study, to much greater than is the case for male students.

Alternatively, it is also possible to say that female students' goals are differentially associated with their strategy use. For example, female students' social conformity goals are uniquely associated with three of their strategies, their performance goals with two, and their social approval and work avoidance goals with one each. Thus, female students' goals are not only interactively associated with their strategy use (ie. more than one goal may impact upon a given strategy) but differentially associated with their strategy use as well (ie. any given goal may be more strongly associated with their strategy use than others).

Examining unique relations between females' strategies and their achievement outcomes, similarly, reveals interactive and differential patterns of association. For example, females' English achievement is associated with both their planning and regulating strategies and females' regulating strategies are associated with their mathematics, English, and PDHPE achievement. In contrast, unique relations between males' strategies and their achievement do not display, to the same degree, at least, this interactivity and differential influence.

These results taken together suggest some intriguing possibilities. First, the salience of various strategies for students' academic achievement appears to vary as a function of gender. That is, students' strategies do not appear to be 'gender neutral', at least as far as associations between these and students' achievement outcomes is concerned. These gender differences in relations between students' strategies and their achievement may be a function of differences in the ways males and females approach different curricula areas from a strategic perspective. Alternatively, differences in the ways males and females react to pedagogical and assessment practices associated with different curricula areas may be associated with differences in their strategy use patterns. Whatever the contextual influences on gender differences in relations between students' strategies and their achievement outcomes may be, however, the salience of gender differences in these relations is, apparently, well established in the present study.

Cultural Differences

Patterns of relations between students' school perceptions, goals, strategies, and achievement also appear to vary substantially as a function of students' cultural backgrounds. Looking first at relations between students' school perceptions and their goal orientations, it is apparent that Anglo-Australian students' sense of belonging to their school is much more strongly associated with their goal orientations than is the case for migrant-background students. This suggests that Anglo-Australian students' motivational goals may be more substantially influenced by their sense of belonging

than is the case with migrant-background students. It is also possible to say that, where migrant-background students' sense of belonging to their school is associated with their goals, it is not associated in the same way as is the case with Anglo-Australian students. Thus, the both the relative influence of students' sense of belonging, and the direction of that influence, is associated with differences in students' cultural backgrounds.

It is also interesting to note that migrant-background students' goals are, uniquely, more narrowly associated with their strategy use than is the case for Anglo-Australian students. Thus, Anglo-Australian students' strategies appear to be, motivationally, more complex than is the case with migrant-background students. In particular, Anglo-Australian students' mastery goals are much more strongly related to their strategy use than is the case for migrant-background students. This is a particularly interesting finding, especially when compared to previous comparisons made on the basis of students' gender and age. Across all these previous comparisons, only one unique path linking students' mastery goals with their strategy use was identified. In the present, single, comparison; three unique paths are identified. Thus, students' cultural background appears to be a particularly discriminating indicator of relations between students' mastery goals and their strategy use.

This finding may have some relevance for goal theory research as whole. The positive link between students' mastery goals and their adaptive use of strategies is well established in the literature. However, the vast majority of studies supporting this link have not specifically examined it in a cross-cultural context. The present study, however, clearly suggests that there may be substantial cultural differences in relations between students' mastery goals and their strategy use. The present study is not able to substantiate why this may be the case. However, there seems to be sufficient reason, based on the present results, to suggest that further research into cross-cultural differences in relations between students' goals, particularly their mastery goals, and strategies may yield some interesting results.

Finally, it is clear that Anglo-Australian students' strategies are more widely associated with their achievement than is the case for migrant-background students. Here, in a similar fashion to previous comparisons, Anglo-Australian students' strategies are both interactively and differentially linked to their achievement outcomes in ways not replicated by migrant-background students. However, both migrant-background and Anglo-Australian students' regulating strategies are linked to their achievement outcomes albeit in different curricula areas. These results suggest that cultural differences in students' strategic approaches, or reactions, to different curricula areas may differentially influence the achievement of different cultural groups. It also suggests that cultural differences in students' achievement may be associated with cultural differences in relations between particular motivational and cognitive variables as well as with more 'direct' cultural differences such as, for example, language differences.

Socioeconomic Differences

Figures Five to Seven indicate that socioeconomic differences may also be associated with structural differences in relations between students' school perceptions, motivation, cognition, and achievement. First, students from both low and medium SES backgrounds display different structural relations between their perceptions of school and their goal orientations when compared to high SES students. This finding is consistent with previous literature which suggests that, in

particular, the academic motivation of students from low SES backgrounds may be more responsive to characteristics of their schooling environments than is the case for students from medium or high SES backgrounds. One proposed explanation for this is that higher SES students' backgrounds may 'insulate' them, to some extent, from (particularly) negative motivational effects associated with their school environments (eg. Stevenson & Baker, 1992).

Second, Figures Five to Seven indicate that students from varying SES backgrounds display structural differences in relations between their goals and strategies. This said, it is clear that, comparing the number of unique paths in each comparison, there are relatively few structural differences based on students' SES differences. It appears then, that difference in relations between students' goals and strategies, based on their SES, are of kind rather than degree. This, in turn, suggests that, unlike differences in students' age, gender, and cultural background; differences in students' SES are not particularly salient indicators of structural differences in relations between their goals and strategies.

The same is not true for structural differences between students' strategies and achievement based on their SES. Here, it is clear that students' from low SES backgrounds have strategies significantly more widely associated with their achievement than is the case for students from medium and high SES backgrounds. Similarly, students' from medium SES backgrounds display wider strategy-achievement relations than high SES students. This means that there is, in the present study, an inverse relation between the number of unique, significant paths linking students' strategies with their achievement and their SES. It may be inferred from this finding that, when students from low SES backgrounds use strategic approaches to learning, these approaches may be particularly adaptive with respect to their achievement outcomes. Such a finding may encourage practitioners charged with improving the academic achievement of students from lower SES backgrounds, especially where pedagogical approaches aimed at enhancing low SES students' achievement involve strategy training and deployment.

Conclusions

The present study implicates two important conclusions. First, students' ages, gender, cultural, and socioeconomic backgrounds may all be salient indicators of differences in relations between their school perceptions, goals, strategies, and achievement outcomes. In other words the former variables appear to matter when examining differences in relations between the later variables. This, in turn suggests that studies examining interacting motivational and cognitive differences between students should take these relevant student differences into account.

Second, both practitioners and researchers are increasingly concerned with modifying students' motivational orientations and cognitive processes. The present study may provide both encouragement and challenge to these efforts. Encouragement may be provided by the fact that students' school perceptions which are, at least to some extent, within the ability of practitioners to modify, may be positively related to students' academic motivation, cognition, and achievement. Therefore, programs aimed at increasing students' achievement by enhancing the degree of academic support students receive at school, and/or strengthening their sense of belonging to their school, may positively influence students' motivation, cognition, and achievement.

However, challenge is provided to both researchers and practitioners because relations between students' school perceptions, goals, strategies, and achievement outcomes appear to be structurally different for different groups of students. That is, relationships between students' school perceptions, motivation, cognition and achievement; vary as a function of their age, gender, cultural, and socioeconomic backgrounds. There is, therefore, an implied need to tailor motivational and cognitive programs, aimed at enhancing students' achievement, based on relevant student differences. This, of course, complicates the issue somewhat. However, it is possible to suggest that the dividends for paying appropriate attention to relevant student differences may well be worth the effort involved in tailoring achievement-enhancing programs to students' differing cognitive and motivational profiles.

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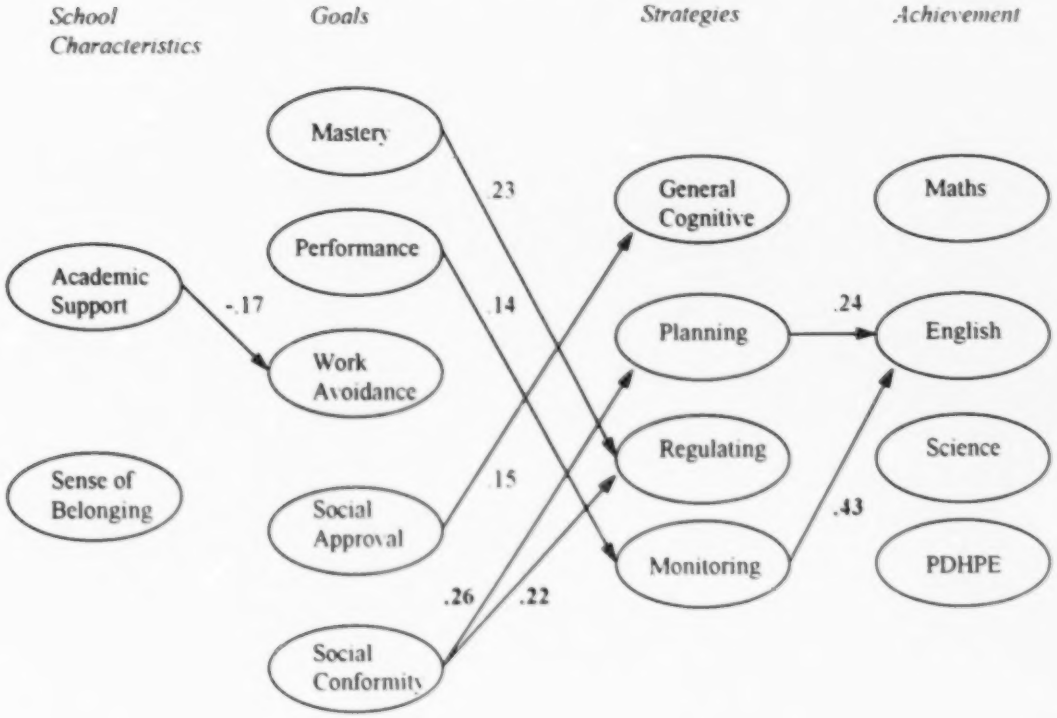
Statistically significant paths unique to younger students



Statistically significant paths unique to older students

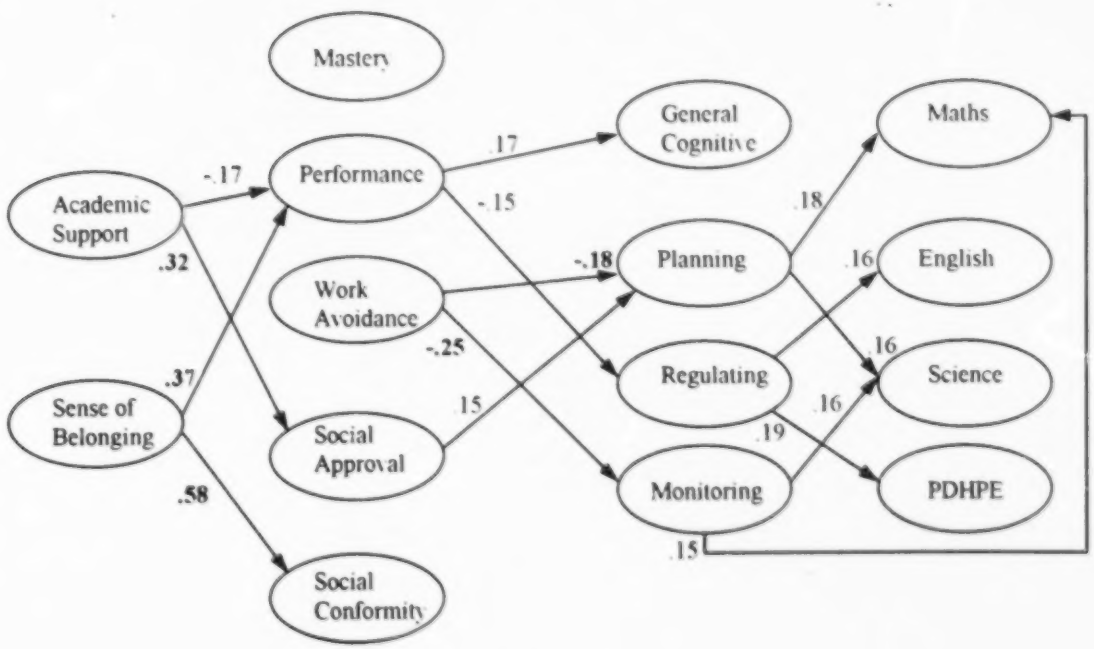
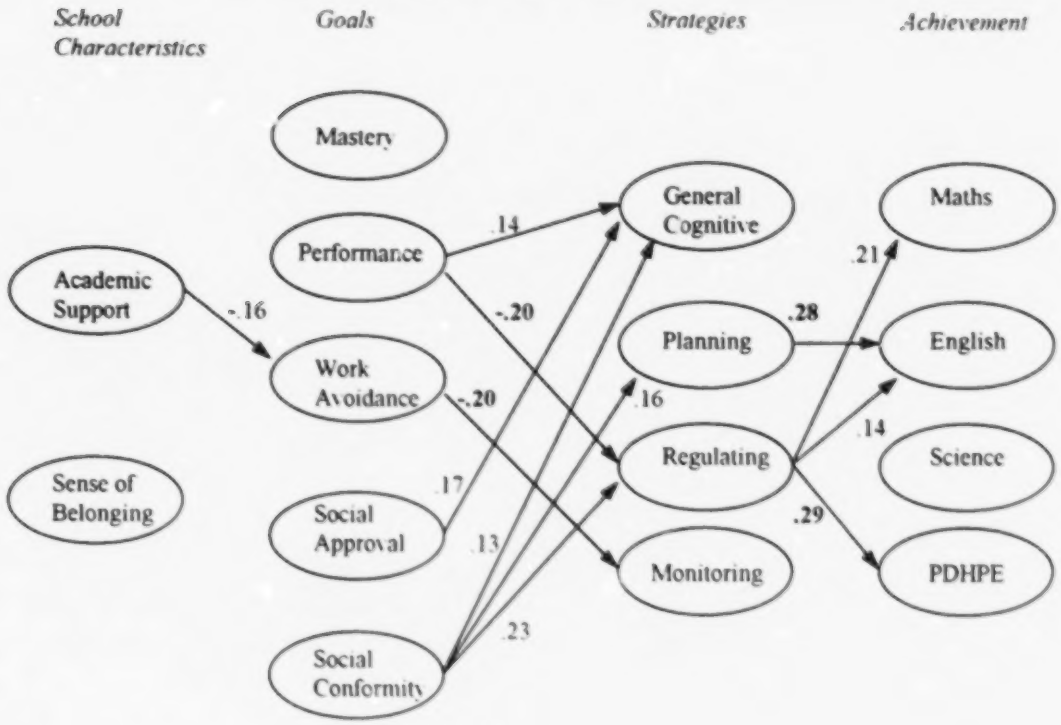


Figure 2. Comparison of models based on students' ages

Statistically significant paths unique to female students



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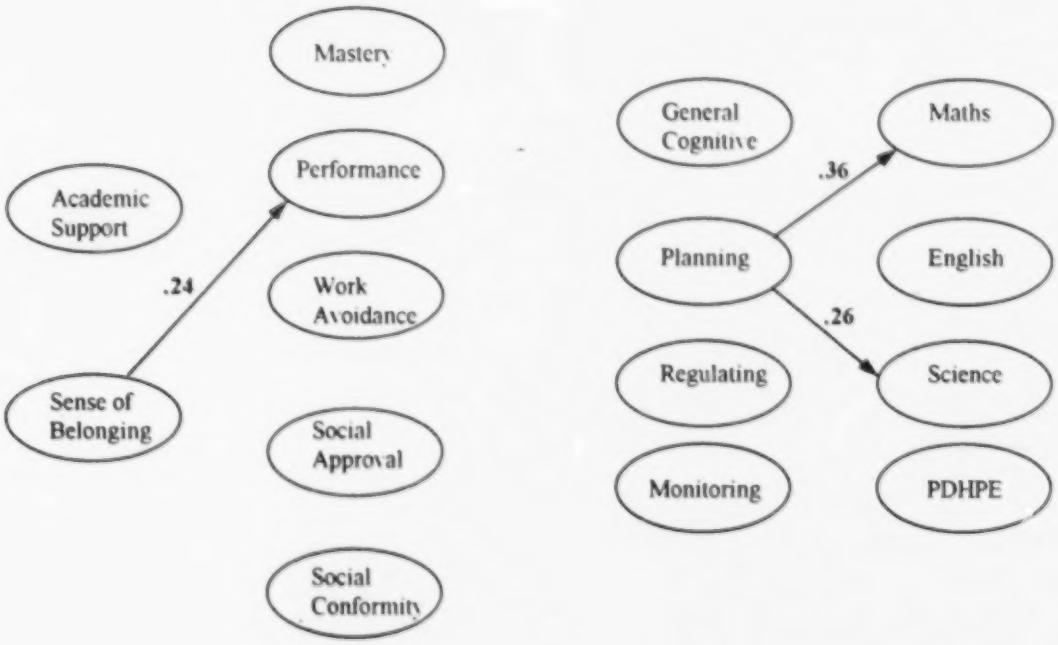
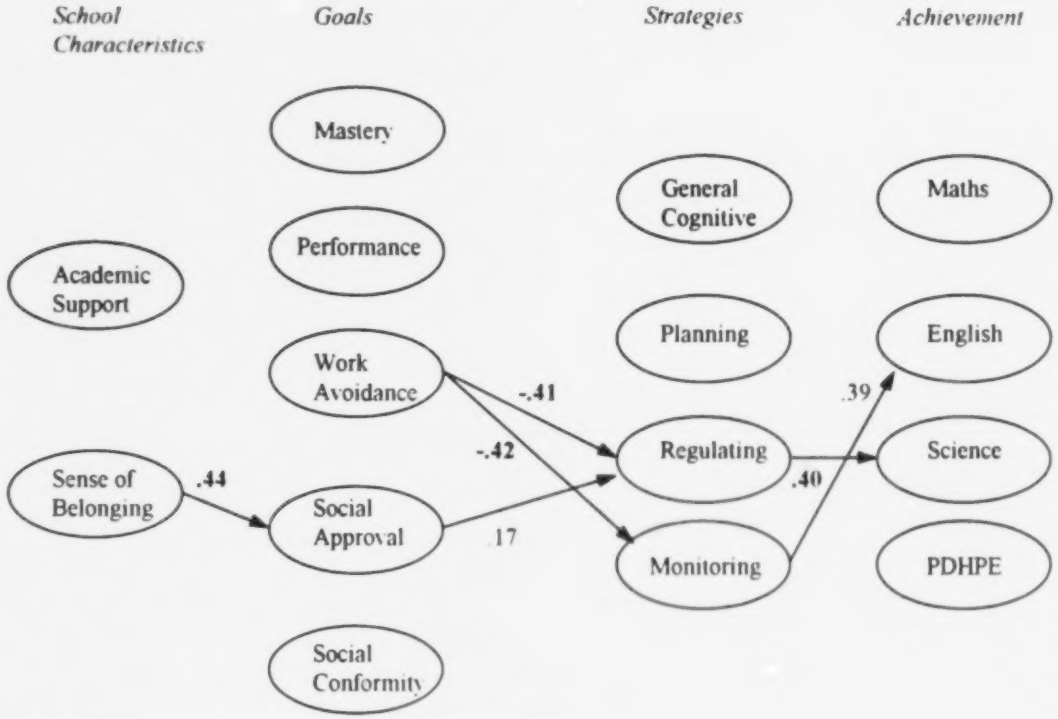


Figure 3. Comparison of models based on students' gender

Statistically significant paths unique to migrant-background students



Statistically significant paths unique to Anglo-Australian students

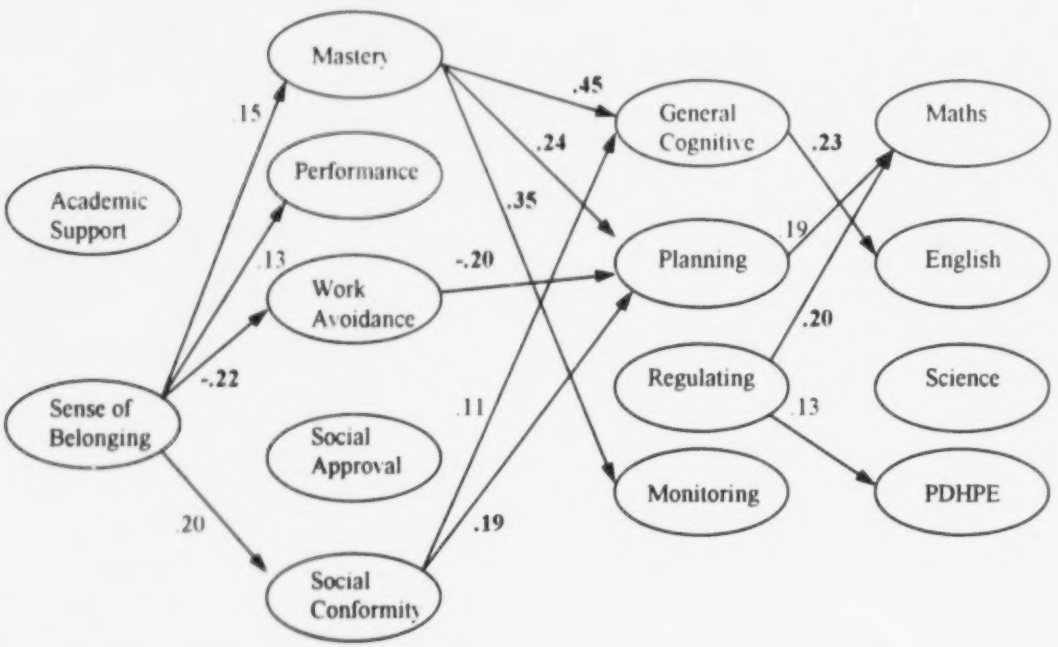
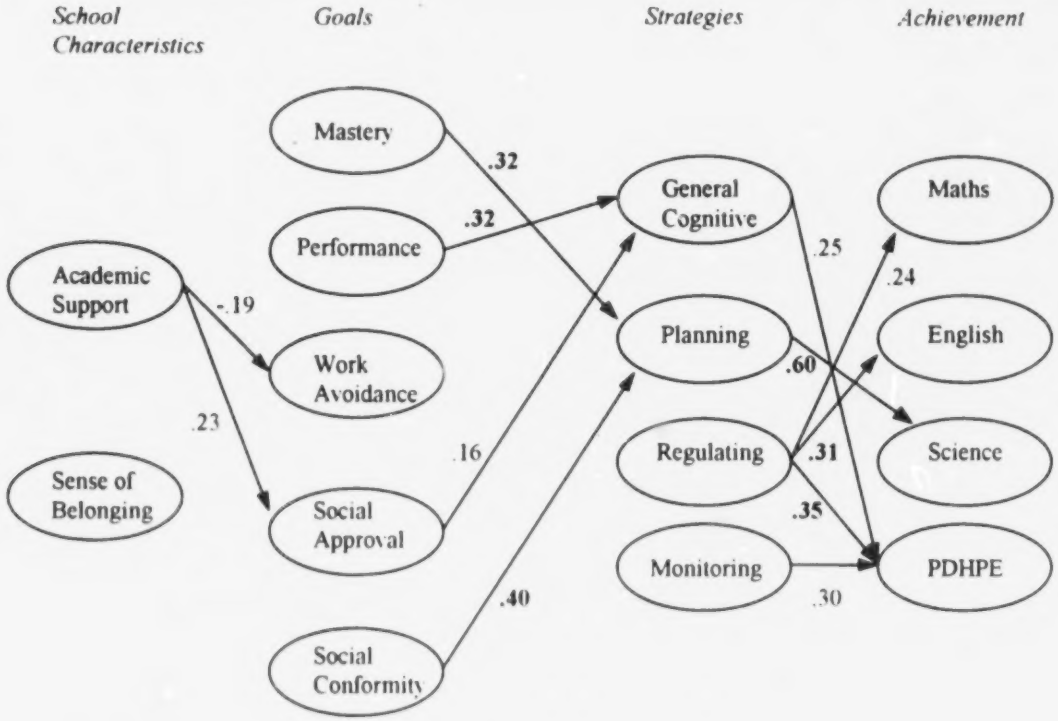


Figure 4. Comparison of models based on students' cultural backgrounds

Statistically significant paths unique to students with low (versus medium) SES



Statistically significant paths unique to students with medium (versus low) SES

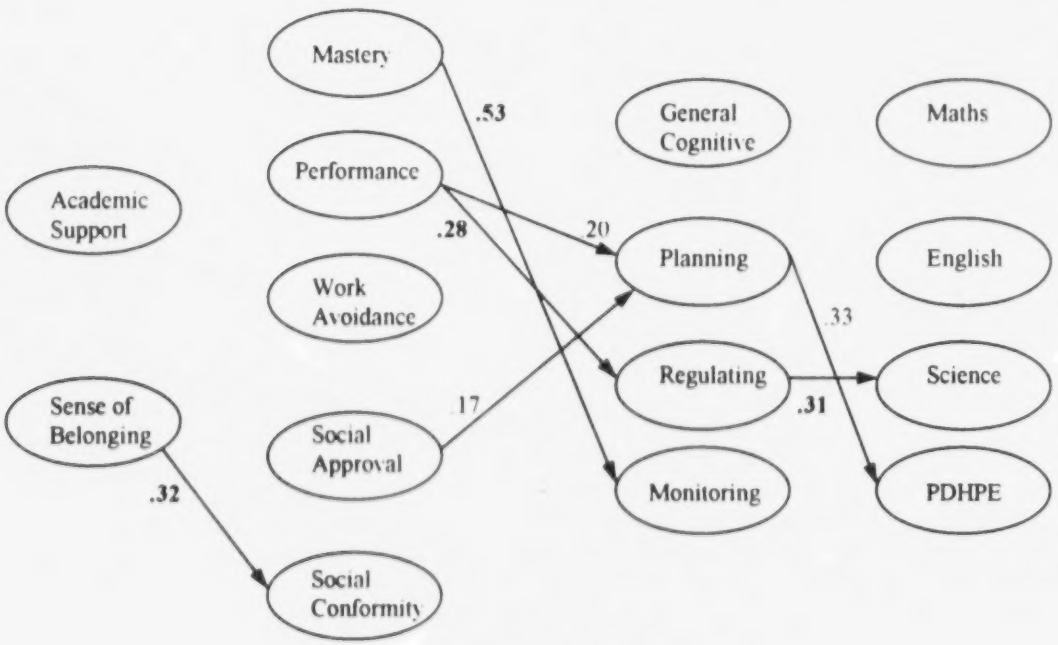
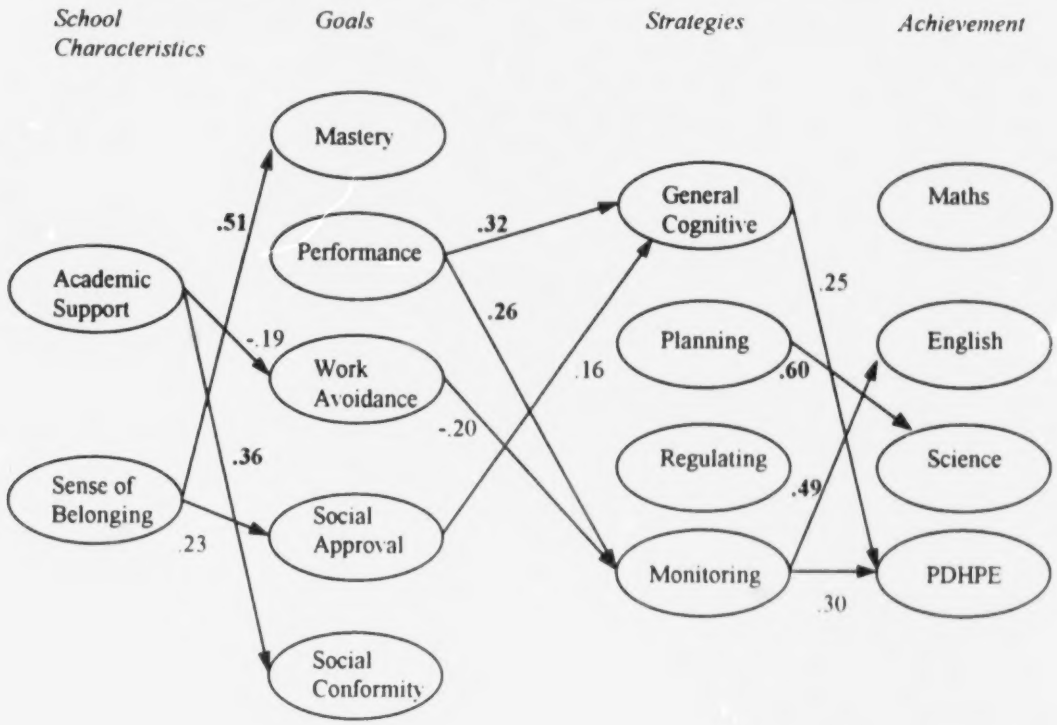


Figure 5. Comparison of models based on students' socioeconomic status (1)

Statistically significant paths unique to students with low (versus high) SES



Statistically significant paths unique to students with high (versus low) SES

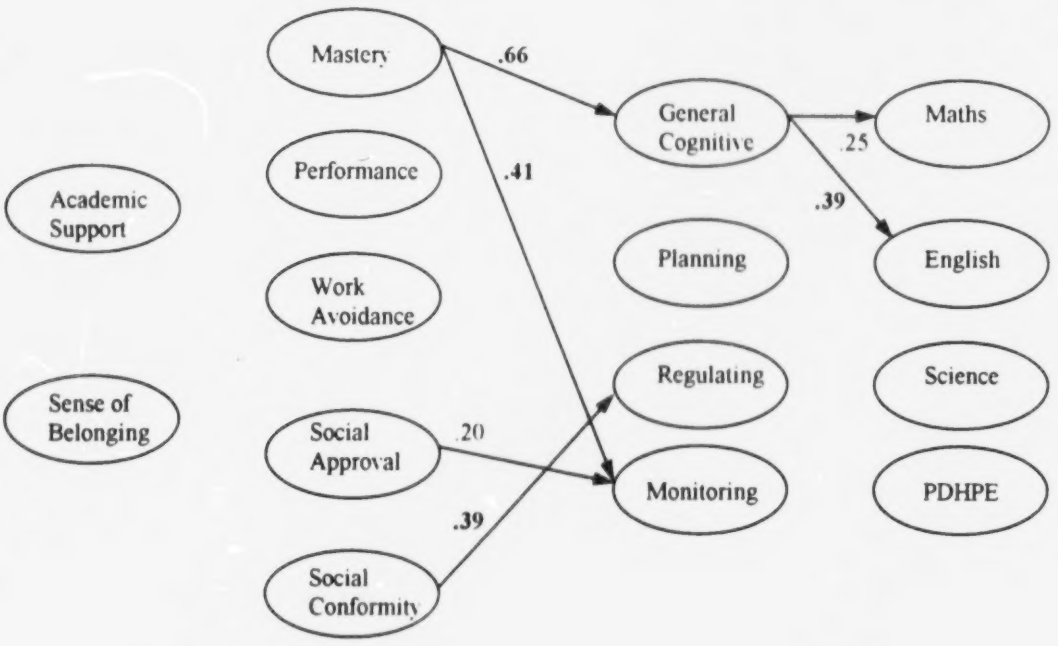
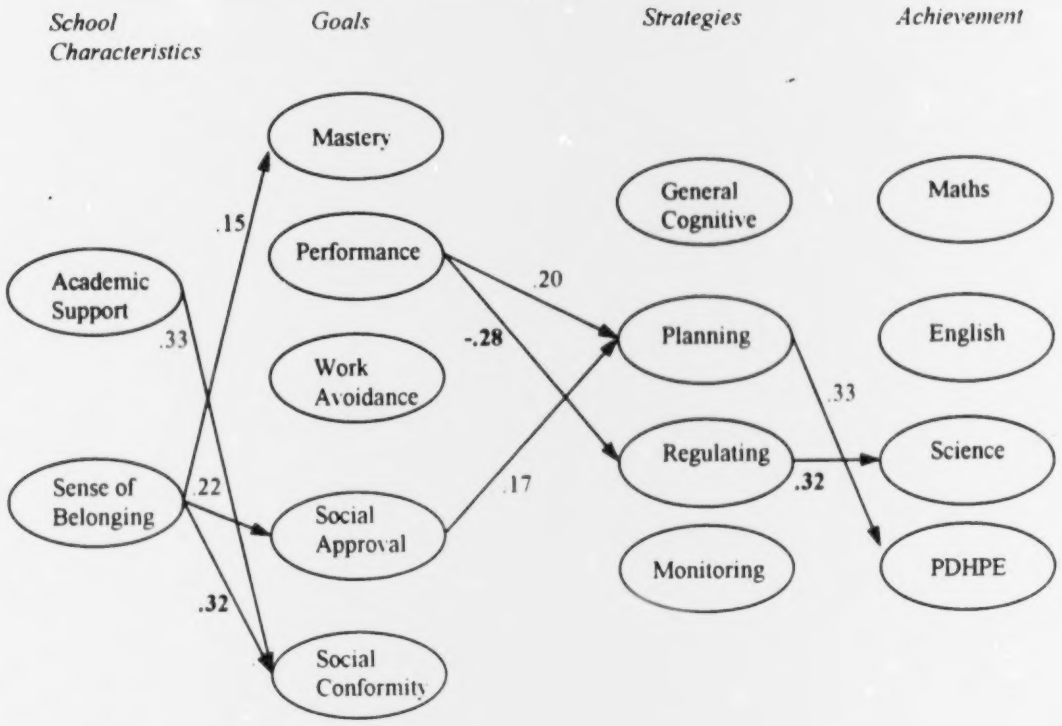


Figure 6. Comparison of models based on students' socioeconomic status (2)

Statistically significant paths unique to students with medium (versus high) SES



Statistically significant paths unique to students with high (versus medium) SES

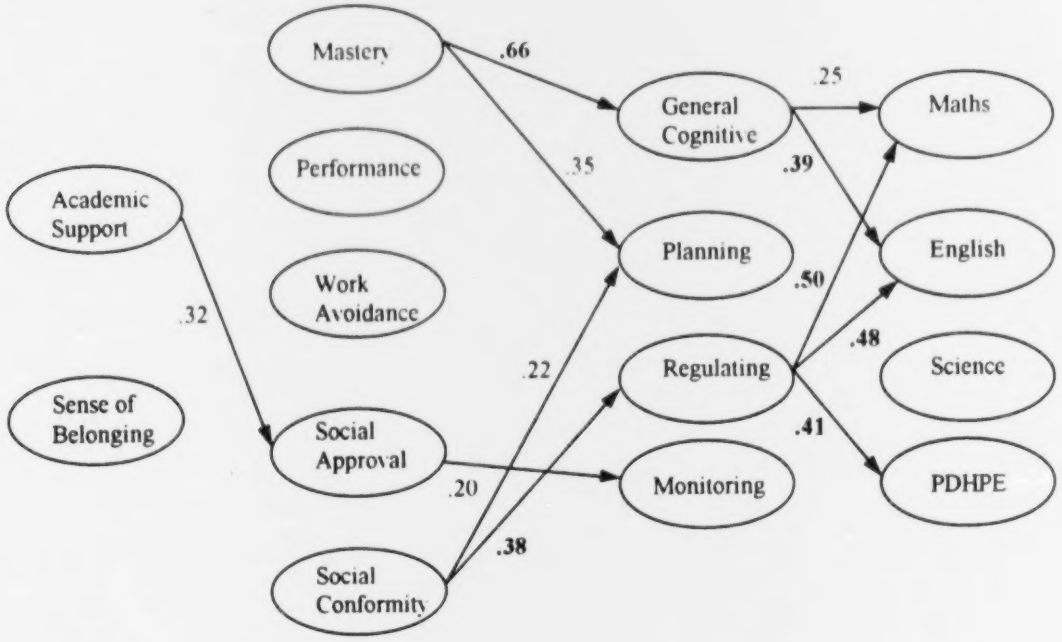
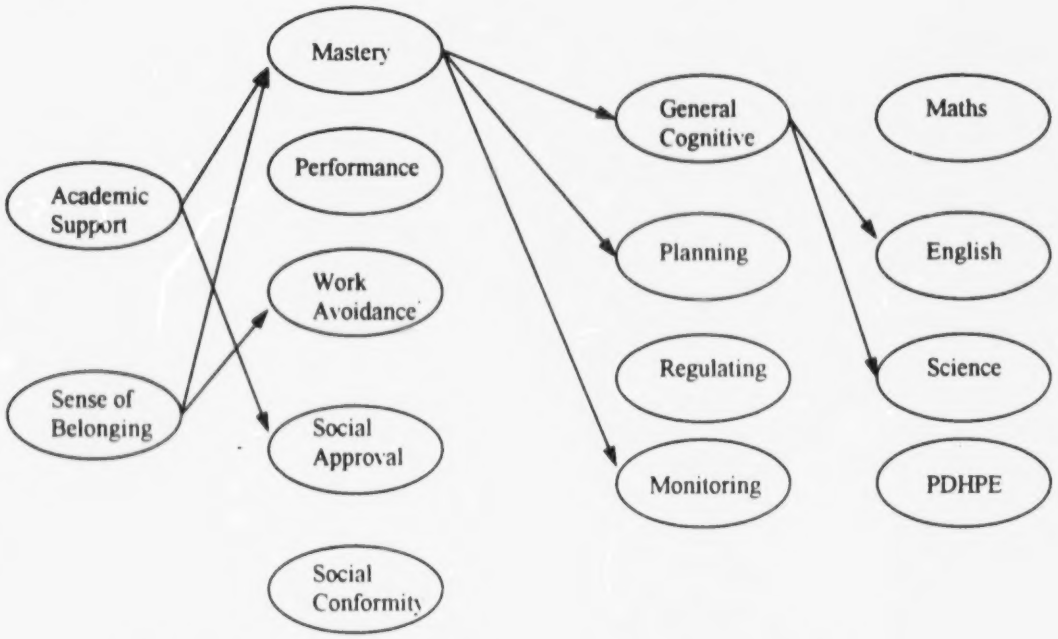


Figure 7. Comparison of models based on students' socioeconomic status (3)

Appendix A

Statistically significant paths common to both younger and older students



Note that, although all paths are significant for both groups, the actual estimates (path coefficients) may vary between younger and older students. For this reason the actual extimates have not been included on the present diagram.